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IS 11323 (1984): Steel Gate Valves for Use in Marine Pipe Work System [TED 17: Shipbuilding]



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“Knowledge is such a treasure which cannot be stolen”

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Indian Standard

SPECIFICATION FOR STEEL GATE VALVES FOR USE IN MARINE PIPE WORK SYSTEM

SECTION 1 GENERAL

1. Scope — Specifies types, classes nominal pressures, nominal size ranges, maximum working conditions and materials.

1.1 Installation notes relative to marine use are also included.

2. Terminology — For the purposes of this standard the following definitions shall apply.

2.1 Nominal Size (DN) — A numerical designation of size which is common to all components in piping system other than components designated by outside diameter. It is a convenient round number for reference purposes and is normally only loosely related to manufacturing dimensions.

3. Valve Types

3.1 Valves shall be of the rising stem, non-rising handwheel type with wedges of the following individual designs:

- Solid wedge with all-metallic trim,
- Flexible wedge with all-metallic trim, and
- Solid wedge with soft seal in wedge facing rings or body seat rings.

3.2 Body end forms included are flanged, butt-weld, socket-weld and screwed.

3.3 For typical valve assemblies and terminology reference should be made to IS : 4854 (Part 1)-1969 'Screw-down stop, check and gate valves and their parts'.

4. Summary of Valves

4.1 Table 1 gives a summary of PN rated valves with regard to nominal pressure and nominal size which will, in general, meet the needs of the shipbuilding industry.

TABLE 1 SUMMARY OF PN RATED VALVES

Nominal Pressure PN (1) bar (see Note 1)	Nominal Size DN Flanged Body End Valves Solid Wedge (2)	Flexible Wedge (3)
10	200 to 600 (see Note 2)	200 to 600 (see Note 2)
16	65 to 600 (see Note 3)	65 to 300 (see Note 3)
25	15 to 600	40 to 300
40	15 to 50	40 to 150 (see Note 4)

Note 1 — 1 bar = 10^5 N/m² = 100 kPa.

Note 2 — For nominal sizes below DN 200 use the next higher rating.

Note 3 — For nominal sizes below DN 65, PN 25 or PN 40 valves are to be used.

Note 4 — For nominal sizes above DN 150, class 300 valves are to be used.

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4.2 Table 2 gives a summary of class rated valves with regard to class rating and nominal size which will, in general, meet the needs of the shipbuilding industry.

TABLE 2 SUMMARY OF CLASS RATED VALVES

Rating Class	Nominal Size DN					
	Solid Wedge			Flexible Wedge		
	Flanged body-end valves*	Butt-weld body-end valves†	Socket-weld body-end valves†	Screwed body-end valves†	Flanged body-end valves*	Butt-weld body-end valves†
300	15 to 50	15 to 50	8 to 50	6 to 50	40 to 300	40 to 300
600	15 to 50	15 to 50	8 to 50	6 to 50	40 to 300	40 to 300
1 500	15 to 50	15 to 50	—	6 to 50	—	—

*For nominal sizes below DN 100 the mating dimensions of class 300 and class 600 flanges are identical.

†Valves of a higher rating may be used subject to availability, since the body end forms permit interchangeability.

5. Nominal Sizes — The ranges of nominal sizes are as follows:

- a) For flanged and butt-weld body ends:
15*, 20*, 25, 32, 40, 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500 and 600.
- b) For socket-weld body ends:
10, 15, 20, 25, 32, 40 and 50.
- c) For screwed body ends:
6, 10, 15, 20, 25, 32, 40 and 50.

SECTION 2 PRESSURE/TEMPERATURE RATINGS AND SERVICE RESTRICTIONS

6. Pressure/Temperature Ratings

6.1 Valves shall be designed to be at least capable of withstanding the pressure/temperature ratings given in Table 3 over the temperature range — 10°C to 400°C appropriate to the body rating except that socket-weld and screwed body end valves shall be restricted to pressure/temperature ratings not exceeding 350°C and 220°C respectively. Service restrictions shall be imposed in accordance with 7.

6.2 The pressure ratings specified in 6.1 are maximum permissible working pressures. Where a system is subject to shock, the purchaser should consider the advisability of applying an appropriate derating factor.

6.3 For temperature up to 120°C, the working pressures given in Table 3 can be used only in systems where the test pressure does not exceed 1.5 times the working pressure. The user should note that there are statutory rules and regulations that require test pressures in excess of 1.5 times the working pressure. For temperature above 120°C the working pressures have been limited so as to obtain a test/working pressure ratio of 2:1 as a minimum in addition to taking account of the reduction in mechanical properties of the materials with increase in temperature.

*Not applicable to butt-weld body end valves.

TABLE 3 PRESSURE TEMPERATURE RATINGS OF VALVES

(C/uses 6.1 and 6.3)

Rating (NP)	Temperature (°C)						Maximum Test Pressure (bar*)
	— 50 to — 31 Pressure (bar*)	— 30 to 120	250	300	350	400	
6	6	6	4.5	4.5	—	—	9
10	10	10	7.5	7.5	6	4	15
16	16	16	12	12	9	6	24
25	25	25	19	18	14	10	37.5
40	40	40	30	28	22	15	60

*1 bar = 0.1 MPa.

6.4 In order to ensure that the test pressures specified by the appropriate related valve standard are not exceed, the user should consider test pressures required for construction and periodic survey and if, necessary, use a valve of a higher rating.

7. Service Restrictions

7.1 Valves complying with the requirements of this standard may be considered for use as indicated in 7.1.1 to 7.1.3 within the limitations of 6.

7.1.1 *Solid wedge valves with stainless steel/copper nickle alloy or stainless steel/hard faced seat surfaces*

7.1.1.1 — Steam and associated boiler services within the following working conditions:

- Nominal sizes below DN 65 : 145 bar and 400°C,
- Nominal sizes DN 65 to DN 300 inclusive 19 bar and 250°C, and
- Nominal sizes above DN 300 : 12 bar and 250°C.

7.1.1.2 Oil (including lubricating, fuel, hydraulic or cargo systems other than crude).

7.1.1.3 Air.

7.1.2 *Solid wedge valves with stainless steel/soft seal seat surfaces*

7.1.2.1 Oil (including fuel, hydraulic or cargo system other than crude, up to temperatures of 200°C).

7.1.2.2 Air up to temperature of 200°C.

7.1.3 *Flexible wedge valves with stainless steel/copper nickel alloy seat surfaces*

7.1.3.1 Steam and associated boiler services up to temperatures of 400°C.

7.1.3.2 Oil (including fuel and hydraulic systems).

7.2 Gate valves complying with the requirements of this standard are not intended for use in chemical cargo or low temperature applications where special material and design requirements exist.

SECTION 3 DESIGN FEATURES

8. Body Ends — Valves shall have body ends in accordance with the requirements of 8.1 to 8.4 as appropriate.

8.1 Flanged — Valves shall have integral flanged body ends in accordance with the requirements of the related valve standard, as appropriate to the nominal pressure or class rating of the valve, unless another form of a flange attachment to the valve body has been agreed between the purchaser, the manufacturer and regulatory bodies concerned.

8.2 Butt-Weld — Valves shall have butt-weld body end or the related valve standard and suitable for use with steel pipe to IS:6011-1970 'Carbon steel tubes for use on boardship for pressure services'. The purchaser shall specify the outside diameter and wall thickness of the pipe to which the valve is to be attached.

8.3 Socket-Weld — Valves shall have socket-weld body ends suitable for use with steel pipe to IS : 6011-1970.

8.4 Screwed — Valves shall have screwed body ends threaded to the requirements of IS : 554-1975 'Dimensions for pipe threads where pressure tight joints are required on the threads, parallel, with positive tolerance deviation'. End faces shall be finished smooth and at right angles to the thread axis. The minimum outside diameters of sealing faces and thread lengths shall be in accordance with Table 4.

TABLE 4 MINIMUM OUTSIDE DIAMETERS OF SEALING FACES AND THREAD LENGTHS

Thread Nominal Size	1/4	3/8	1/2	3/4	1	1½	1¾	2
Minimum Outside Diameter of Sealing Face (mm)	18	22	26	32	39	49	55	68
Minimum Thread Length (mm)	11.0	11.4	15.0	16.3	19.1	21.4	21.4	25.7

9. Face-to-Face Dimensions of Flanged Body End Valves and End-to-End Dimensions of Butt-Weld Body End Valves — Face to face and end-to-end dimensions of flange and butt-weld body end valves shall be in accordance with IS : 9884-1981 'Dimensions for ferrous valves face-to-face and end-to-end'.

10. End-to-End Dimensions of Socket-Weld and Screwed End Valves — End-to-end dimensions of socket-weld end screwed body end valves are not specified and shall be in accordance with the manufacturer's standard practice.

11. Body Tappings

11.1 When drainage facilities are required this shall be specified (see 31.3).

11.2 By-pass facilities shall be provided on all flexible wedge valves greater than DN 150 for pressure ratings PN 25 and higher and also on other flexible wedge valves for which operation of the valve against the appropriate differential pressure given in Table 5 and 6 would require a greater force on the handwheel rim than the value of 350 N specified in 17.3. For flexible wedge valves of pressure rating class 300 and above, a combined by-pass and body equalizing pipe shall be fitted on all valves greater than DN 150.

11.3 The scantlings of the by-pass and pressure equalizing pipes shall be suitable for the pressure/temperature ratings specified in 6.1.

11.4 Valve used in the by-pass or body pressure equalizing pipes shall be of a pressure rating at least equal to that of the main valve.

11.5 Connections of flexible wedge valves shall be either flanged or welded. Connections on solid wedge valves may be screwed, flanged or welded. Flanges shall comply with the requirements of IS : 6392-1971 'Steel pipe flanges' appropriate to the nominal pressure or class rating of the valve. Screwed connections shall have parallel threads complying with the requirements of IS : 554-1975 'Dimensions for pipe threads where pressure tight joints are required on the threads' and, in the case of drain connections, a parallel threaded plug with a washer face shall be fitted.

12. Wedges — Where flexible wedges are specified or supplied they shall be of tapered 'H' section. Flexible wedge valves may be supplied in place of solid wedge valves by agreement between the purchaser and the manufacturer.

13. Body-to-Bonnet Connections — Body-to-bonnet connections shall be in accordance with the requirements of the related valve standard except that tongue-and-groove, ring joint or welded connection shall be supplied only when agreed by the purchaser.

14. Handwheels — Handwheel should preferably be of the 'marine' pattern conforming to IS : 11218-1984 'Marine valve hand wheels'.

15. Stems

15.1 Where lubrication of the stem screw thread is provided it shall be in the form of a button head lubrication nipple in accordance with IS : 4009 (Part 1)-1981 'Grease nipples : Part 1 Button head grease nipples'.

15.2 When specified by the purchaser, valves shall be provided with protection for the stem.

16. Position Indicators — Where specified, valves shall be supplied with a position indicator. Attention is drawn to the fact that indicators are required on certain systems by regulatory bodies.

17. Operations

17.1 Unless by-pass facilities are provided, valves of nominal sizes 65 to 300 inclusive shall be at least suitable for handwheel operation against the pressure differential given in Table 5 or 6. Solid wedge valves above nominal size 300 shall be at least suitable for handwheel operation against a pressure differential of 4 bar.

TABLE 5 PRESSURE DIFFERENTIALS OF PN RATED VALVES
(Clause 11.2)

Nominal Pressure PN	Pressure Differential
bar	bar
10	7.5
16	12
25	19
40	30

TABLE 6 PRESSURE DIFFERENTIALS OF CLASS RATED VALVES
(Clause 11.2)

Class	Pressure Differential
	bar
300	38
600	75

17.2 All valves smaller than nominal size 65 shall be at least suitable for handwheel operation against the valves' design pressure rating at 120°C.

17.3 Valves shall be supplied for manual handwheel operation unless otherwise specified. The force at the handwheel rim shall not exceed 350 N.

17.4 Where actuator operated valves are also required to be capable of manual operation this shall be specified.

17.5 Where specific requirements for locking the valve in open/partial/closed positions exist, these shall be specified by the purchaser.

17.6 Where local operation of a valve is not feasible, the purchaser should specify the requirements of extended spindle/stem for remote operation.

SECTION 4 MATERIALS

18. Bodies, Bonnets and Yokes

18.1 Unless otherwise agreed between the purchaser and the manufacturer, valves shall be supplied in carbon steel complying with the requirements of the related valve standard.

18.2 Attention is drawn to the requirements of the regulatory bodies in respect of materials for boiler, pressure vessel and machinery construction.

18.3 The manufacturer shall accept a system of identification that will enable all finished material to be traced to the original cast.

19. Internal Parts in Contact with the Line Fluid

19.1 The material used shall be in accordance with the related valve standard qualified by the requirement of **7** of this standard. The purchaser shall specify in the enquiry and/or order the appropriate trim required.

20. Stem Packings and Bonnet Gaskets

20.1 Valves shall have stem packings and bonnet gaskets of material suitable for the pressure/temperature ratings and services specified in **6** and **7** respectively. Stem packings incorporating graphite shall not be used with stainless steel stems.

21. Soft Seals in Wedge Facing Rings or Body Seat Rings

21.1 Soft seals shall be of a fluoro-polymer material suitable for the services specified in **7.1.2**.

22. By-Pass and Pressure Equalizing Pipes

22.1 All pipings shall comply with the requirements of IS : 6011-1978 'Carbon steel tubes for use on boardships for pressure services'. Valves used in the by-pass and/or pressure equalizing pipes shall be of at least similar materials to that of the main valve.

SECTION 5 TESTING, INSPECTION, CERTIFICATES AND REPAIR OF DEFECTS

23. Testing

23.1 Testing of valves shall be in accordance with IS : 6157-1971 'General rules for inspection of valves and cocks for fluid control purposes' except that valves specifically ordered for lubricating oil applications shall be tested with a straight mineral oil having a viscosity of about 100 Redwood No. 1 at 15°C or with water containing a water soluble oil or rust inhibitor.

23.2 Where valves are required to be tested at the manufacturer's or the supplier's works in the presence of a regulator body or the purchaser's inspector, this shall be stated at the time of enquiry and/or order together with the name of the inspecting body.

24. Inspection

24.1 Where valves are required to be inspected by a representative of a regulatory body of the

purchaser this shall be stated at the time of enquiry and/or order, together with the name of the inspecting body.

25. Certificates of Conformity

25.1 When specified by the purchaser, a certificate of conformity shall be supplied stating that the valve and valve parts, including testing, conform with the requirements of the related valve standard, this standard and the purchase order.

26. Repair of Defects

26.1 Repairs to pressure-containing parts requiring inspection by a regulatory body shall not be undertaken without prior approval by the purchaser and the regulatory body. Any repair may be made to the satisfaction of the purchaser and the regulatory body.

SECTION 6 MARKING AND PREPARATION FOR DESPATCH

27. Marking

27.1 Valves shall be marked in accordance with IS : 9866-1981 'Marking system for valve'.

27.1.1 Attention is drawn to the requirements of the regulatory bodies in respect of identification and marking of materials.

28. Preparation for Despatch

28.1 Valves shall be prepared for despatch in accordance with the appropriate related valves standard.

SECTION 7 ENQUIRY AND/OR ORDER INFORMATION AND INFORMATION REQUIRED FROM MANUFACTURER

29. Enquiry and/or Order Information

29.1 The information to be supplied by the purchaser shall be in accordance with the appropriate related valve standard together with the following requirements:

- a) Nominal pressure (PN) or class designation. Attention is drawn to **6.1**.
- b) If a position indicator is required (*see 16*).
- c) If witnessing of tests of inspection is required, name of inspecting body (*see 23* and *24*).
- d) If valves are required to be tested for lubricating oil service (*see 23.1*).
- e) Any information required from the manufacturer.

30. Information Required from Manufacturer

30.1 When specified by the purchaser, the manufacturer shall supply at the tendering stage the following details:

- a) Overall dimensions of valve, and
- b) Mass of valve.

SECTION 8 INSTALLATION

31. Installation Requirements

31.1 Valves complying with the requirements of this standard are not intended for use under throttling conditions.

31.2 It is recommended that, wherever possible, valves be mounted with their stems in a vertical upright position.

31.3 When valves are mounted in vertical pipelines, drain tapping should be specified on the valves, the valve being installed with the drain connection above the valve center-line, that is above the wedge.

31.4 All valves fitted with body pressure equalizing pipes shall be installed such that the body space between the seat sealing faces with the valve closed can be equalized with that of the pipe-work upstream of the valve or is automatically equalized when the by-pass valve is opened.

31.5 When valves complying with the requirements of this standard are to be used in the cargo oil systems of product carriers, it is recommended that the valve should be of the soft seal design. Provision should be made on installation to bleed the body space when the valve is in the closed position.

31.6 Where it is proposed to use butt-weld valves of the soft seal design, it is recommended that the soft seals should be in the wedge, and the wedge removed during any welding operations.

31.7 Gate valves may also be used for the carriage of crude oil.

EXPLANATORY NOTE

This standard is one of a series of Indian Standards on valves for use in marine pipe work systems. In the preparation of this standard, considerable assistance has been derived from BS MA 65 : Part 2 : 1976 'Specification for general purpose and petroleum industry valves for use in marine pipe work systems: summary and application: Part 2 Steel gate valves', issued by the British Standards Institution (BSI).